

REMARKS

Objection to claims 10-11

The Examiner objected to claims 10-11 as being dependent upon a rejected base claim but stated that claims 10-11 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. In response, Applicants have amended claims 10 and 11 in the manner provided herein. Applicants respectfully request allowance of claims 10 and 11.

Rejection Under 35 U.S.C. §103(a)

The Examiner rejected claims 1-4, 8, 12-13, 17-19, 21-24, and 27 under 35 U.S.C. §103(a) as being unpatentable over Patel (U.S. Patent No. 5,396,403).

Claims 1 and 12 and amended claim 27 respectively recite "cooling fluid in contact with the active surface" (emphasis added), "moving a cooling fluid across an active surface of the integrated circuit die" (emphasis added), and "cooling fluid ... in contact with the active region of the integrated circuit die" (emphasis added). Patel does not teach or suggest the cited portions of claims 1 and 12 and amended claim 27. Patel recites "a plurality of integrated circuit chips 13 mounted on a first surface 15 of the substrate by means of solder bumps 17" (col. 4, lines 46-48). As the Examiner admits, Patel does not teach or suggest use of a cooling fluid. Applicants respectfully submit that claims 1, 12, and 27 are allowable over the teachings and suggestions of Patel.

Amended claim 8 and claim 17 recite respectively "cooling fluid contacts a region between the interposer and the integrated circuit die" (emphasis added) and "a cooling fluid disposed between the first integrated circuit die and the interposer" (emphasis added). Patel recites "a plurality of integrated circuit chips 13 mounted on a first surface 15 of the substrate by means of solder bumps 17" (col. 4, lines 46-48). Patel further recites "FIG. 4 illustrates ... substrate 61 that has one or more chips 63 on an upper surface 65 and more chips 67 on a lower surface 69" (col. 6, lines 5-8). As the Examiner admits, Patel does not teach or suggest use of a cooling fluid. Applicants respectfully submit that amended claim 8 and claim 17 are allowable over the teachings and suggestions of Patel.

Accordingly, Applicants request the Examiner to allow claims 1, 12, and 17 and amended claims 8 and 27.

Applicants request allowance of claims 2-4 for at least the same reasons as pertain to claim 1. Applicants request allowance of claim 13 for at least the same reasons as pertain to base claim 12. Applicants request allowance of claims 18-19 and 21-24 for at least the same reasons as pertain to base claim 17.

The Examiner rejected claim 5 under 35 U.S.C. §103(a) as being unpatentable over Patel in view of Lin (U.S. Patent No. 6,188,578). Claim 5 depends from base claim 1. Lin does not cure the deficiency of Patel with regards to the cited portion of claim 1. Applicants respectfully submit that claim 5 is allowable over the teachings and suggestions of Patel in view of Lin for at least the same reasons as pertain to claim 1.

The Examiner rejected claims 6, 20, 26, and 28 under 35 U.S.C. §103(a) as being unpatentable over Patel in view of Vogel (U.S. Patent No. 6,317,326). Claim 6 depends from base claim 1. Claims 20 and 26 depend from base claim 17. Claim 28 depends from base claim 27. Vogel does not cure the deficiency of Patel with regards to the cited portions of base claims 1, 17, and 27. Applicants respectfully submit that claims 6, 20, 26, and 28 are allowable over the teachings and suggestions of Patel in view of Vogel for at least the same reasons as pertain to the relevant base claims.

The Examiner rejected claims 7, 9, 14-16, 25 and 29 under 35 U.S.C. §103(a) as being unpatentable over Patel in view of Daikoku (U.S. Patent No. 5,349,831). Claim 7 depends from base claim 1. Claim 9 depends from base claim 8. Claims 14-16 depend from base claim 12. Claim 25 depends from base claim 17. Claim 29 depends from base claim 27. Daikoku does not cure the deficiency of Patel with regards to the cited portion of claims 1, 8, 12, 17, and 27. Applicants respectfully submit that claims 7, 9, 14-16, 25 and 29 are allowable over the teachings and suggestions of Patel in view of Daikoku for at least the same reasons as pertain to the relevant base claims.

Accordingly, applicants respectfully request the Examiner to allow pending claims 1-29.

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Respectfully submitted,



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**VERSION OF AMENDED CLAIMS WITH
MARKINGS TO SHOW CHANGES MADE**

8. (Amended) A method of forming an integrated circuit package comprising:

attaching an interposer to a package substrate;
attaching an integrated circuit die to the interposer;
covering the package substrate, the integrated circuit die, and the

interposer with a heat spreader to form an internal chamber;
filling the internal chamber with a cooling fluid, wherein the cooling fluid contacts a region between the interposer and the integrated circuit die.

10. (Amended) A method of forming an integrated circuit package comprising:

attaching an interposer to a package substrate;
attaching an integrated circuit die to the interposer;
covering the package substrate, the integrated circuit die, and the
interposer with a heat spreader to form an internal chamber;
filling the internal chamber with a cooling fluid by pumping cooling fluid
through a via in the package substrate and

~~The method of claim 9 further comprising:~~

sealing the via after the internal chamber is filled.

11. (Amended) A method of forming an integrated circuit package comprising:

attaching an interposer to a package substrate;
attaching an integrated circuit die to the interposer;
covering the package substrate, the integrated circuit die, and the
interposer with a heat spreader to form an internal chamber;

filling the internal chamber with a cooling fluid ~~The method of claim~~
~~8, wherein the filling of the internal chamber is done~~ by pumping cooling
fluid through an inlet, and sealing closed the inlet when the filling is
complete.

27. (Amended) An integrated circuit package comprising:

an integrated circuit die housed within a chamber, wherein the
integrated circuit die includes an active region;

a cooling fluid filling the chamber and in contact with the active
region of the integrated circuit die.